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Evaluation of New Canal Point Sugarcane Clones

2007–2008 Harvest Season

Abstract

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Twenty-eight replicated experiments were conducted on 9 farms (representing 4 muck and 2 sand soils) to evaluate 44 new Canal Point (CP) and 11 new Canal Point and Clewiston (CPCL) clones of sugarcane from the CP 03, CP 02, CP 01, CP 00, CPCL 01, CPCL 00, and CPCL 99 series. Experiments compared the cane and sugar yields of the new clones, complex hybrids of *Saccharum* spp., primarily with yields of CP 89-2143, and to a lesser extent with CP 72-2086 and CP 78-1628. All three were major sugarcane cultivars in Florida. Each clone was rated for its tolerance to diseases and cold temperatures. Based on results of these and previous years' tests, two new clones—CP 01-1372 and CPCL 97-2730—were released for commercial production in Florida.

The audience for this publication includes growers, geneticists and other researchers, extension agents, and individuals who are interested in sugarcane cultivar development.

Keywords: Brown rust, histosol, muck soil, orange rust, organic soil, *Puccinia kuehnii*, *Puccinia melanocephala, Saccharum* spp., *Sporisorium scitaminea,* sugarcane cultivars, sugarcane smut, sugarcane yields, sugar yields.

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Abbreviations

CP	Canal Point
CPCL	Canal Point and Clewiston
CV	Coefficient of variation
KS/T	Theoretical recoverable yield of kg 96° sugar in kg per metric ton of cane
LSD	Least significant difference
NIRS	Near infrared reflectance spectroscopy
TC/H	Cane yields in metric tons per hectare
TS/H	Theoretical yields of sugar in metric tons per hectare
USSC	United States Sugar Corporation

Evaluation of New Canal Point Sugarcane Clones

2007–2008 Harvest Season

B. Glaz, S.J. Edmé, J.C. Comstock, R.W. Davidson, N.C. Glynn, R.A. Gilbert, S. Sood, and I.A. del Blanco

Breeding and selection for clones that can be used for commercial production of sugarcane, complex hybrids of *Saccharum* spp., support the continued success of this crop in Florida. Though production of sugar per unit area is a principal selection characteristic, it is not the only factor on which sugarcane is evaluated. In addition, analyses are made on the concentration of sugar and on the fiber content of the cane. The economic value of each clone integrates its harvesting, transportation, and milling costs with its expected returns from sugar production. Deren et al. (1995) developed an economic index for clonal evaluation in Florida. Evaluation of clonal suitability also includes its reactions to endemic pathogens.

This report summarizes the cane production and sugar yields of the clones in the plant-cane, first-ratoon, and second-ratoon stage IV experiments sampled in Florida's 2007–2008 sugarcane harvest season. This information is used to identify commercial cultivars in Florida and identify clones with useful characteristics for the Canal Point program. The information is also used by representatives of other sugar industries to request Canal Point clones.

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The time of year and the duration that a clone yields its highest quantity of sugar per unit area is important because the Florida sugarcane harvest season extends from October to April. Because sugarcane is commercially grown in plant and ratoon crops, clones are evaluated accordingly. Adaptability to mechanical harvesters is an important trait in Florida. All sugarcane sent to Florida mills and much of the sugarcane used for planting is mechanically harvested. Before a new clone is released, Florida growers judge its acceptability for mechanical operations.

Clones with desired agronomic characteristics also must be productive in the presence of harmful diseases, insects, and weeds. Some pathogens rapidly develop new, virulent races or strains. Because of these changes in pathogen populations, clonal resistance is not considered permanent. The selection team must try not to discard clones that have sufficient resistance or tolerance to pests, but it also must discard clones that are too susceptible to pests to be grown commercially.

The disease that has caused the most difficulty in Florida in selecting resistant sugarcane cultivars has been brown rust, caused by *Puccinia melanocephala* Syd & P. Syd. From 2000 to 2005, this program discarded 15 clones that were within 1 year of commercial release due to new infections of brown rust. During the summer of 2007, commercial sugarcane fields in Florida were infected with orange rust, caused by *Puccinia kuehnii* E.J. Butler (Comstock et al. 2008). This program has had the most success in selecting resistant cultivars for sugarcane smut, caused by *Sporisorium scitaminea* (Syd.) M. Piepenbring, M. Stoll, & F. Oberwinkler. Other diseases the Canal Point program must contend with are leaf scald, caused by *Xanthomonas albilineans* (Ashby) Dow; sugarcane yellow leaf virus, a disease caused by a luteovirus (Lockhart et al. 1996); sugarcane mosaic strain E., and ratoon stunting, caused by *Leifsonia xyli* subsp. *xyli* Evtsuhenko et al. Ratoon stunting has probably been the most damaging, though the least visible, sugarcane disease in Florida. A program to improve resistance of CP clones to ratoon stunting is underway (Comstock et al. 2001). In addition to

improved resistance, growers have the options to minimize losses by planting stalks that do not contain the bacteria that cause ratoon stunting. This can be accomplished either by planting stalks that have been treated with hot-water therapy that kills the ratoon stunting bacteria or by using disease-free stalks derived from meristem tissue culture.

Scientists at Canal Point screen clones in their selection program for resistance to brown rust, orange rust, smut, leaf scald, sugarcane yellow leaf virus, mosaic, ratoon stunting, and eye spot caused by *Bipolaris sacchari* (E.J. Butler) Shoemaker. Eye spot is not currently a commercial problem in Florida.

Sugarcane growers in Florida depend more on tolerance to sugarcane diseases than on resistance because of the difficulty of developing high-yielding cultivars that are resistant to all diseases. In the 2007 growing season, 6 cultivars comprised 89.9 percent of Florida's sugarcane (Glaz 2008). All eight of these six cultivars—CP 72-2086, CP 78-1628, CP 80-1743, CP 84-1198, CP 88-1762, and CP 89-2143—were at least moderately susceptible to one or more of the following sugarcane diseases: brown rust, orange rust, mosaic, leaf scald, smut, and ratoon stunting. Glaz et al. (1986) presented a formula and procedure to help growers distribute their available sugarcane cultivars while considering possible attacks of new pests.

Damaging insects in Florida are the sugarcane borer, *Diatraea saccharalis* (F.); the sugarcane lace bug, *Leptodictya tabida*; the sugarcane wireworm, *Melanotus communis*; the sugarcane grub, *Ligyrus subtropicus*; and the West Indian cane weevil, *Metamasius hemipterus* (L.).

Winter freezes are common in the region of Florida where much of the sugarcane is produced. The severity and duration of a freeze and the tolerance of specific sugarcane cultivars are the major factors that determine how much damage occurs. The damage caused by such freezes ranges from no damage to death of the mature sugarcane plant. The rate of deterioration of juice quality after a freeze depends on the ambient air temperature: Warmer post-freeze temperatures result in more rapid deterioration of juice quality. Freezes also damage young sugarcane plants. Stalk populations may decline after severe freezes kill aboveground parts of recently emerged plants. The most severe damage occurs when the growing point is frozen, which is more likely if the plant has emerged from the soil. Tai and Miller (1996) reported that resistance to a light freeze (1.7 ºC to -2.8 ºC) was not significantly correlated to fiber content, but resistance to a moderate freeze (-5.0 ºC) was.

Each year at Canal Point, 50,000 to 100,000 seedlings are evaluated from crosses derived from a diverse germplasm collection. However, Deren (1995) suggested that the genetic base of U.S. sugarcane breeding programs was too narrow. About 80 percent of the cytoplasm in commercial sugarcane is *Saccharum officinarum*. This year, about half of the parental clones in our program originated from Canal Point, while the other half were developed by the United States Sugar Corporation (USSC) (CL clones). Additional parents originate from Louisiana or Texas breeding programs.

The USSC, based in Clewiston, Florida, discontinued its breeding program in 2004. Approximately the top 25 percent of clones in all selection stages from the USSC program were donated to the Canal Point program. Clones from the USSC program have traditionally been designated with a CL (Clewiston) prefix. Donated clones in this report that were evaluated in CP trials will have a CPCL (Canal Point and Clewiston) designation and retain their USSC numbers.

The seedling stage planted in 2008 contained approximately 63,000 new clones that originated from true seeds planted in the greenhouse and was then transplanted to the field. Once selected as seedlings, clones are vegetatively propagated. Because of this vegetative propagation, from this stage (seedling stage) on in the selection program, each plant (clone) is genetically identical to its precursor, assuming no mutations. The stage I trial, selected from approximately 51,000 seedlings and

planted in December 2007, contained approximately 14,000 new clones. The stage II trial, planted in January 2008, had 1,319 new clones. The 2007 plant-cane stage III trial had 135 new clones (101 CP clones and 34 CPCL clones) that were tested in replicated experiments on 4 grower farms. Each of the first three stages (seedling, stage I, and stage II) was evaluated for 1 year in the plant-cane crop at Canal Point. Selection is visual in the seedling phase. In stage 1, the first selection process is visual. The clones that are selected visually are then analyzed with a hand-punch Brix, and heavy emphasis is placed on Brix results. The primary selection criteria for stage II and all subsequent stages are sugar yield (in metric tons of sugar per hectare), theoretical recoverable sucrose, cane tonnage, and disease resistance.

The 135 stage III clones are evaluated for 2 years, in the plant-cane and first-ratoon crops, in commercial sugarcane fields at four locations—three with organic soils and one with a sand soil. The 13 to 14 most promising clones identified in stage III receive continued testing for 4 more years in the stage IV experiments where they are planted in successive years and evaluated in the plant-cane, first-ratoon, and second-ratoon crops. Clones that successfully complete these experimental phases undergo 2 to 4 years of evaluation and expansion by the Florida Sugar Cane League, Inc., before commercial release. Some of the League's evaluation occurs concurrently with the stage IV evaluations. The Canal Point selection program is summarized in appendix 1.

Edmé et al. (2005) found that the CP program has been responsible for substantial sugarcane yield improvements in Florida. However, these yield improvements occurred on the muck soils on which sugarcane is grown in Florida (about 80% of Florida's sugarcane) and not on the 20 percent of Florida's sugarcane that is grown on sand soils. Based on this finding, scientists are conducting a comprehensive review of the CP program to identify changes that can improve results for sand soils without compromising successes on muck soils. Based on the recommendation of Glaz and Kang (2008), one location with a muck soil was dropped from stage IV and one with a sand soil was added. Thus, this program now plants at three, rather than at two locations in stage IV on sand soils, but it has not increased the total number of locations in stage IV.

Clones with characteristics that may be valuable for sugarcane breeding programs are identified throughout the selection process. Even though the Canal Point program breeds and selects sugarcane in Florida, some CP clones have been productive commercial cultivars in Texas and outside of the United States. Sugarcane geneticists in other programs often request clones from Canal Point. From May 2007 to April 2008, clones or seeds from the Canal Point program were requested from and sent to Costa Rica, Guatemala, Nicaragua, Pakistan, the People's Republic of China, and Senegal.

Test Procedures

In 26 experiments, 44 new CP and CPCL clones were evaluated. Three clones of the CP 03 series, eight clones of the CPCL 00 series, and two clones of the CPCL 01 series were evaluated at five farms with muck soils in the plant-cane crop. Seven clones of the CP 03 series, three clones of the CPCL 00 series, and three clones of the CPCL 01 series were evaluated at two farms with sand soils in the plant-cane crop. Eight clones (CP 03-1160, CP 03-1491, CP 03-2188, CPCL 00-1373, CPCL 00-4027, CPCL 00-6131, CPCL 01-0271, and CPCL 01-0571) were evaluated at all seven locations (muck and sand soils), five were evaluated on muck soils only, and five were evaluated on sand soils only. Six clones of the CP 02 series and seven clones of the CPCL 99 series were evaluated at two farms in the plant-cane crop and at eight farms in the first-ratoon crop. Thirteen clones of the CP 01 series were evaluated at two farms in the first-ratoon crop and at seven farms in the second-ratoon crop. Fourteen clones of the CP 00 series were evaluated at two farms in the second-ratoon crop.

CP 89-2143 was the primary reference clone. For experiments of new CP and CPCL clones on sand

soils, CP 78-1628 was an important secondary reference clone. In 2007, CP 89-2143 was the most widely grown cultivar in Florida and CP 78-1628 the most widely grown cultivar on sand soils in Florida (Glaz 2008). CP 72-2086 was sometimes used as a reference clone for KS/T. CP 72-2086 was the sixth most widely grown cultivar in Florida in 2007 (Glaz 2008).

Agronomic practices, such as fertilization, pest and water control, and cultivation were conducted by the farmer or farm manager responsible for the field in which each experiment was planted.

Both second-ratoon experiments and the first-ratoon experiment of the CP 01 series planted at Okeelanta Corporation (Okeelanta) south of South Bay were conducted on Dania muck soil. Also, the plant-cane and first-ratoon experiments at A. Duda and Sons', Inc. (Duda), southeast of Belle Glade, was conducted on Dania muck. As described by Rice et al. (2002), Dania muck is the shallowest of the histosols (organic soils) comprised primarily of decomposed sawgrass (*Cladium jamaicense* Crantz) in the Everglades Agricultural Area. The maximum depth to the bedrock of Dania muck is 51 cm. The other organic soils similar to Dania muck are Lauderhill muck (51 to 91 cm depth to bedrock), Pahokee muck (91 to 130 cm to bedrock), and Terra Ceia muck (more than 130 cm to bedrock).

All experiments at Knight Management, Inc. (Knight) southwest of 20-Mile Bend, Sugar Farms Cooperative North—SFI Region S05 (SFI) near 20-Mile Bend in Palm Beach County, and Wedgworth Farms, Inc. (Wedgworth) east of Belle Glade, were conducted on Lauderhill muck. In addition, the plant-cane experiment at Duda, both plant-cane experiments at Okeelanta, and the CP 02 first-ratoon experiment at Okeelanta were conducted on Lauderhill muck.

All three experiments at Sugar Farms Cooperative North—Osceola Region S03 (Osceola) were conducted on Pahokee muck. The three experiments at Eastgate Farms, Inc. (Eastgate) north of Belle Glade were conducted on Torry muck. The three experiments at Hilliard Brothers of Florida, Ltd. (Hilliard) west of Clewiston were on Malabar sand. The three experiments at Lykes Brothers, Inc. (Lykes) near Moore Haven in Glades County were on Pompano fine sand.

The CP 02 and CPCL 99 series experiment in the plant-cane crop at Okeelanta, as well as the CP 01 series in the first-ratoon crop and the CP 00 series second-ratoon experiment at Okeelanta, were planted on fields in successive sugarcane rotations. In this rotation in Florida, a new crop of sugarcane is planted within about 2 months of the previous sugarcane harvest, a practice that increases the number of harvests per year but decreases yields per hectare (Glaz and Ulloa 1995). All other experiments were planted in fields that had not been cropped to sugarcane for approximately 1 year. In all experiments, plots were arranged in randomized-complete-block designs with six replications.

In all experiments of CP and CPCL clones, all plots had three rows, a border row, and two inside rows used for yield determination. These two rows were 10.7 m long and 3.0 m wide (0.0032 ha). The distance between rows was l.5 m, and 1.5-m alleys separated the front and back ends of the plots. The outside row of each plot was a border row and it was usually planted with the same clone as the inside two rows. All inside rows of each plot in all replications and the border row of each plot in three replications were planted with two lines of stalks. The border row of each plot in the remaining three replications was planted with one line of stalks. Experiments were two clones (6 rows) wide, and each replication was 16 plots long. An extra 1.5 m of sugarcane protected each row at the front and back of each test.

Samples of 10 stalks were cut from unburned cane from a middle row of each plot in each experiment between October 15, 2007, and February 4, 2008. In addition, preharvest samples of 10 stalks were cut from 2 replications of all plant-cane experiments between October 10 and October 12, 2007. Once a stool of sugarcane was chosen for

cutting, the next 10 stalks in the row were cut as the 10-stalk sample. The range of sample dates for each crop was as follows:

Plant-cane crop	January 3, 2008 to February 4, 2008
First-ratoon crop	October 26, 2007 to January 28, 2008
Second-ratoon crop	October 15, 2007 to October 25, 2007

After each stalk sample was transported to the Agricultural Research Service's Sugarcane Field Station at Canal Point, FL, for weighing and milling, crusher juice from the milled stalks was analyzed for Brix and pol, and theoretical recoverable yield of kg 96º sugar (in kg per metric ton of cane: KS/T) was determined as a measure of sugar content. The fiber percentage of each clone was used to calculate theoretical recoverable yield (Legendre 1992). The values of theoretical recoverable yield determined by the Legendre (1992) method were multiplied by 0.86 to better predict recoverable yield in a Florida sugarcane mill. Brix and pol were usually estimated by near infrared reflectance spectroscopy (NIRS); Brix and pol were measured for samples with unacceptable NIRS calibrations by refractometer and polarimeter, respectively.

Using 3-stalk samples collected from border rows, an average of 16, 11, 10, 8, 10, 9, and 8 fiber samples were calculated for the clones of the CP 00, CP 01, CP 02, CP 03, CPCL 99, CPCL 00, and CPCL 01 series, respectively. Leaves were stripped from these stalks, which were then processed through a Jeffco1 cutter-grinder (Jeffries Brothers, Ltd., Brisbane Queensland, Australia). About 150 g of material (fresh bagasse) processed through the cutter-grinder were collected and weighed. The fresh bagasse was then placed in cloth bags, washed twice in a washing machine, and dried at 49º C until its weight did not decline (about 3 days). The fiber percentage of a clone was calculated by dividing its dry bagasse weight by its fresh bagasse weight. Samples of a reference clone were processed on all dates that fiber samples of new clones were processed. All fiber percentages calculated on a given day were corrected to the historical fiber percentage of the reference clone.

Total millable stalks per plot were counted between May 24 and August 28, 2007. Cane yields (in metric tons per hectare: TC/H) were calculated by multiplying stalk weights by number of stalks. Theoretical yields of sugar (in metric tons per hectare: TS/H) were calculated by multiplying TC/H by KS/T and dividing by 1,000.

To assess cold tolerance, stage IV clones were subjected to freezing temperatures in three field experiments established at the Hague Farm of the Florida Institute of Food and Agricultural Sciences, University of Florida, in Hague, near Gainesville, FL. Air temperatures usually go down to -2 to -4 ºC at the testing site during winter months, which guarantees exposure of the clones to harsher freeze temperatures than normally found in south Florida. Clones of the CP 00 series, along with two reference cultivars (CP 72-2086 and CP 89-2143), were planted on February 22, 2005, as two randomized-complete-block experiments with four replications in single-row plots 1.5 m long and 2.4 m apart and with 2.4 m breaks between replications. Five-stalk samples were cut for analyses of sucrose content on January 13, January 27, and March 15, 2006. Some clones were not sampled on all three dates because of insufficient stalk numbers. Clones of the CP 01, CP 02, and CPCL 99 series were planted on March 16, 2006, using the same plot configurations and compared with the same two reference cultivars as well as CP 78-1628. Five stalks were sampled from each plot on January 13, February 6, and March 5, 2007. Clones of the CP 03, CPCL 00, and CPCL 01 series were planted similarly to the previous tests on March 5, 2007. Five-stalk samples were collected from the plant-cane crop on December 6, 2007 and February 6, 2008 and from the first-ratoon crop on December 4, 2008 and January 12, 2009. Cold-tolerance rankings for all three experiments were based on temporal deterioration of juice quality in mature stalks after exposure to freezing temperatures.

Prior to their advancement to stage IV, CP clones were evaluated in separate tests by artificial inoculation for susceptibility to sugarcane smut, sugarcane mosaic virus, leaf scald, and ratoon stunting. CP clones were inoculated in stage II plots to determine eye spot susceptibility. Since being advanced to stage IV, separate artificial-inoculation tests were repeated on clones for smut, ratoon stunting, mosaic, and leaf scald. Each clone was also field rated for its emergence, early plant height, tillering, and shading, as well as for its reactions to natural infection by sugarcane smut, sugarcane brown rust, sugarcane orange rust, sugarcane mosaic virus, and leaf scald in stage IV.

Statistical analyses of the stage IV experiments were based on a mixed model using SAS software (SAS version 9.1, 2003; SAS Institute, Inc. Cary, NC) with clones as fixed effects and locations and replications as random effects. Least squares means were calculated for clones. Means of locations were estimated by empirical best linear unbiased predictors. Significant differences were sought at the 10 percent probability level. Differences among clones were tested by the least significant difference (*LSD*), which was used regardless of significance of F-ratios to protect against high type-II error rates (Glaz and Dean 1988). The mean square error of the clone × location interaction was the error term used to calculate this *LSD*. Clones that had significantly higher yields than the reference clone were also identified by individual t tests calculated by SAS. Values of *LSD* were also calculated to approximate significant differences among locations using the mean square error of replications within locations as the error term.

Results and Discussion

Table 1 lists the parentage, percentage of fiber, and reactions to smut, brown rust, orange rust, leaf scald, mosaic, and ratoon stunting for each clone included in these experiments. Tables 2–5 contain the results of clones from the CP 03, CPCL 00, and CPCL 01 series in plant-cane experiments at locations with muck soils, and tables 6–7 contain the results for plant-cane experiments of clones from these three series planted at locations with sand soils. Tables 8–9 contain the results of plant-cane experiments of clones from the CP 02 and CPCL 99 series, and tables 10–12 contain results of clones from these two series in first-ratoon experiments. Table 13 contains the results of the CP 01 first-ratoon experiments and tables 14–16 contain the results of the CP 01 second-ratoon experiments. Table 17 contains the results of the CP 00 second-ratoon experiments. Table 18 gives cold-tolerance ratings for clones of the CP 00, CP 01, CP 02, CP 03, CPCL 99, CPCL 00, and CPCL 01 series. Table 19 gives the dates that stalks were counted in each experiment.

Plant-Cane Crop, CP 03, CPCL 00, and CPCL 01 Series on Muck Soils

When averaged across all five locations, two new clones—CPCL 00-4111 and CP 03-2188—yielded significantly more TC/H (metric tons of cane per hectare) and TS/H (metric tons of sugar per hectare) than CP 89-2143 (tables 2 and 5). The TS/H yield of CPCL 00-4111 was also significantly higher than that of any other clone except CP 03-2188. The preharvest and harvest KS/T (theoretical recoverable yield of 96º sugar in kg per metric ton of cane) values of CPCL 00-4111 and CP 89-2143 were similar (tables 3–4). The preharvest and harvest KS/T values of CP 03-2188 were significantly less than those of CP 89-2143.

Sugarcane in Florida is propagated by planting stem sections (referred to as seed cane) from which axillary buds emerge. The Florida Sugar Cane League, Inc., has begun increasing seed cane of CPCL 00-4111 at all stage IV locations (table 1). As its seed cane is increased, more disease testing will be conducted. There is particular concern regarding the undetermined susceptibility of CPCL 00-4111 to orange rust and leaf scald. CPCL 00-4111 is also susceptible to ratoon stunting, but growers can control that disease by planting disease-free seed cane. CP 89-2143 is considered as a commercial cultivar in Florida with excellent freeze tolerance because it sustains its juice quality well after exposure to moderate freezes. CPCL 00-4111 ranked 9th in freeze tolerance compared with

CP 78-1628, CP 89-2143, and CP 72-2086, which ranked 7th, 11th, and 21st, respectively (table 18). The fiber content of CPCL 00-4111 was 11.29 percent (table 1). Seed cane of CP 03-2188 was not increased due to its low KS/T.

Plant-Cane Crop, CP 03, CPCL 00, and CPCL 01 Series on Sand Soils

When averaged across both locations with sand soils, CP 03-1912 was the only new clone that yielded significantly more TS/H than CP 78-1628 (table 7). Its TC/H yield was also greater than that of CP 78-1628 and was greater than the TC/H yield of each clone in this test except CP 03-1160. The harvest KS/T values of CP 03-1912, CP 78-1628, and CP 89-2143 were similar, but the preharvest KS/T of CP 03-1912 was significantly less than the preharvest KS/T values of CP 78-1628 and CP 89-2143 (table 6).

The Florida Sugar Cane League, Inc., has begun increasing seed cane of CP 03-1912 at all stage IV locations (table 1). Currently there are no disease concerns for CP 03-1912. CP 03-1912 had good cold tolerance; it ranked 6th compared with CP 78-1628, CP 89-2143, and CP 72-2086, which ranked 7th, 11th, and 21st, respectively (table 18). The fiber content of CP 03-1912 was 9.61 percent (table 1).

Plant-Cane Crop, CP 02 and CPCL 99 Series

Last year's report contained the results from eight locations of the CP 02 and CPCL 99 series plant-cane crop (Glaz et al. 2008). This year, plant-cane results are available from two additional locations (tables 8–9). No new clone had significantly higher mean yields of TC/H, preharvest KS/T, or TS/H, than CP 89-2143. CPCL 99-4455 had a higher harvest KS/T than CP 89-2143 (table 8). However, the TC/H yield of CP 89-2143 was significantly higher than that of CPCL 99-4455 and although the TS/H yields of these two clones were similar, both CP 78-1628 and CP 72-2086 had significantly higher TS/H yields than CPCL 99-4455 (table 9).

First-Ratoon Crop, CP 02 and CPCL 99 Series

When averaged across all eight farms, four new clones—CP 02-1564, CPCL 99-2206, CPCL 99-1401, and CPCL 99-2103—yielded significantly more TC/H and TS/H than CP 89-2143 (tables 10 and 12). The KS/T yields of CPCL 99-2103, CP 02-1564, CPCL 99-1401, and CP 89-2143 were similar (table 11). However, the KS/T yield of CPCL 99-2206 was significantly lower than that of CP 89-2143 (table 11). These four new clones are not candidates for release due to disease susceptibilities. CP 02-1564 and CPCL 99-2206 are susceptible to brown rust, CPCL 99-1401 is susceptible to leaf scald and also has undetermined susceptibility to brown and orange rust, and CPCL 99-2103 is susceptible to smut, brown rust, orange rust, mosaic, and ratoon stunting (table 1).

Seed cane of CPCL 99-2574 and CPCL 99-4455 is being increased at all stage IV locations (table 1) based on promising results from last year's tests as plant cane (Glaz et al. 2008). Both new clones had low yields of TC/H (table 10). The TC/H of each new clone was similar to that of CP 89-2143. However, the TC/H yield of CPCL 99-4455 was nearly significantly lower than that of CPCL 99-2574 and four new clones had significantly higher TC/H yields than CPCL 99-2574 (table 10). The strongest attribute of each new clone is its KS/T. CPCL 99-4455 was the only new clone with a significantly higher KS/T yield than that of CP 89-2143 (table 11). The KS/T of CPCL 99-4455 was also significantly higher than that of CPCL 99-2574, but the KS/T values of CPCL 99-2574 and CP 89-2143 were similar. CPCL 99-2574, CPCL 99-4455, and CP 89-2143 had similar yields of TS/H (table 12). However, the TS/H yields of CPCL 99-2574 and CPCL 99-4455 were significantly less than the TS/H yields of three and four new clones, respectively. CPCL 99-2574 has no disease concerns, whereas CPCL 99-4455 is susceptible to smut and ratoon stunting (table 1). CPCL 99-2574 had excellent freeze tolerance; it ranked 3rd compared with CP 78-1628, CP 89-2143, and CP 72-2086, which ranked 1st, 5th, and 14th, respectively (table 18). The freeze tolerance

of CPCL 99-4455 has not been tested. CPCL 99-2574 has a moderately high fiber content (11.99%) and the fiber content of CPCL 99-4455 (10.37%) is similar to that of CP 89-2143 (9.85%) and CP 78-1628 (10.37%).

First-Ratoon Crop, CP 01 Series

Last year's report contained information for the CP 01 series in the first-ratoon crop at seven locations and in the plant-cane crop at Eastgate and Okeelanta (Glaz et al. 2008). In addition, Glaz et al. (2007a) reported on results of these clones from eight locations in the plant-cane crop. This year, in the first-ratoon crop at Okeelanta and Eastgate, four new clones—CP 01-1378, CP 01-1372, CP 01-2390, and CP 01-1564—yielded significantly more TC/H and TS/H than CP 89-2143. The KS/T values of all four new clones were similar to each other and were similar to the KS/T of CP 89-2143. CP 01-1378 (brown rust, orange rust, leaf scald, and mosaic) and CP 01-2390 (smut and ratoon stunting) are not candidates for release due to disease susceptibilities (table 1). Previous yields of CP 01-1564 as plant cane and first ratoon did not warrant consideration for release. CP 01-1372 has been released for commercial production and will be discussed more fully in the following section.

Second-Ratoon Crop, CP 01 Series

When averaged across all seven locations, CP 01-1372 and CP 01-1378 yielded significantly more TC/H and TS/H than CP 89-2143 (tables 14 and 16). Both new clones and CP 89-2143 had similar yields of KS/T (table 15). As noted in the previous section, CP 01-1378 is not being considered for commercial release due to disease susceptibilities. However, CP 01-1372 was released for commercial production in Florida in October 2008. This year as second ratoon, CP 01-1372 had excellent plant-cane and first-ratoon yields of cane and sugar on all soils (Glaz et al. 2007a and Glaz et al. 2008). CP 01-1372 had excellent freeze tolerance; it ranked 3rd, compared with CP 78-1628, CP 89-2143, and CP 72-2086, which ranked 1st, 5th, and 14th, respectively (table 18). CP 01-1372 was resistant to all major diseases and had a fiber content of 9.45 percent.

Second-Ratoon Crop, CP 00 Series

When combined across Okeelanta and Eastgate in the second-ratoon crop, no new clone of the CP 00 series had significantly higher yields than CP 89-2143 (table 17). Last year, CP 00-1101, CP 00-1446, and CP 00-2180 were released for commercial production in Florida (table 1). Based on yields the previous 3 years, CP 00-1101 was recommended for all soil types, but CP 00-1446 and CP 00-2180 were recommended only for growers with sand soils (Glaz et al. 2007a, Glaz et al. 2007b, and Glaz et al. 2008). This year as second ratoon, CP 00-1101 and CP 89-2143 had similar yields of TC/H, KS/T, and TS/H (table 17). CP 00-1446, CP 00-2180, and CP 89-2143 had similar yields of TC/H and TS/H. However, the KS/T of each new cultivar was lower than that of CP 89-2143. One reason that CP 00-1446 and CP 00-2180 were not recommended for muck soils was the low value of KS/T on muck soils of each new cultivar in previous tests. The fiber contents of CP 00-1101, CP 00-1446, and CP 00-2180 were 10.15, 8.86, and 9.46 percent, respectively (table 1). Freeze rankings for CP 72-2086, CP 89-2143, CP 00-1101, CP 00-1446, and CP 00-2180 were 12th, 3rd, 2nd, 11th, and 16th, respectively (table 18).

Summary

In the past, this program generally advanced the same clones to stage IV on the muck and sand soils. This year, stage IV clones were advanced to muck and sand independently. This resulted in eight genotypes being planted in all tests, five genotypes being planted only at locations with muck soils, and five genotypes being planted only at locations with sand soils.

The CP 03, CPCL 00, and CPCL 01 series were tested at five locations with muck soil this year for the first time in stage IV. CPCL 00-4111 had high TC/H and TS/H yields and it had acceptable yields of KS/T. Seed cane of CPCL 00-4111 is being expanded by the Florida Sugar Cane League, Inc., for potential commercial release in Florida, but its susceptibilities to brown rust and orange rust are

being monitored. CP 03-2188 had high yields of TC/H and TS/H, but it is not being expanded for potential release due to its low KS/T yields.

A second group of CP 03, CPCL 00, and CPCL 01 clones was tested at two locations with sand soils this year for the first time in stage IV. CP 03-1912 had no disease concerns, high yields of TC/H and TS/H, and acceptable yields of KS/T. The Florida Sugar Cane League, Inc., has begun expanding seed cane of CP 03-1912 for potential commercial release in Florida.

The CP 02 and CPCL 99 series were tested at two locations in the plant-cane crop and eight locations in the first-ratoon crop this year and at eight locations in the plant-cane crop last year. The Florida Sugar Cane League, Inc., is increasing seed cane of CPCL 99-2574 and CPCL 99-4455 for potential release. Both new clones have had high KS/T yields in both years of testing; however, their yields of TC/H and TS/H were mediocre this year as plant cane and first ratoon. CP 02-1564 had high yields of TC/H and TS/H for both years but its seed cane is not being expanded due to its susceptibility to brown rust.

The CP 01 series was tested as plant cane at eight locations 2 years ago and at two additional locations last year. It was also tested at eight locations in the first-ratoon crop last year and at two additional locations this year. Also, the CP 01 series was tested at seven locations in the second-ratoon crop. CP 01-1372 has had high TS/H, TC/H, and harvest KS/T yields throughout the three-crop cycle and was released for commercial production in Florida in September 2008. In addition to its high yields, there were no disease susceptibilities associated with CP 01-1372 and it had excellent tolerance to freezing temperatures.

Stage IV testing of the CP 00 series was completed this year with two second-ratoon experiments. Previous testing of these clones included 2 years and 11 locations as plant cane, 2 years and 10 locations as first ratoon, and 9 locations as second ratoon last year. No new clones were released from this group. The CP 00 series was tested at one location in the first-ratoon crop and nine locations in the second-ratoon crop this year, at two locations in the plant-cane crop and nine locations in the first-ratoon crop last year, and at nine locations in the plant-cane crop 2 years ago. Based on results reported here and the previous two reports of this series, CP 00-1101 was released and recommended for all soils on which sugarcane is grown in Florida, and CP 00-1446 and CP 00-2180 were released and recommended for sand soils in Florida. High yielding clones not released due to disease concerns were CP 00-1100, CP 00-1748, and CP 00-1751.

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Tables

Notes (tables 2–17):

1. Clonal yields approximated by least squares ($p = 0.10$) within and across locations.

2. Location yields approximated by empirical linear unbiased predictors.

3. *LSD* = least significant difference.

4. *CV* = coefficient of variation.

Table 1. Parentage, fiber content, increase status, and ratings of susceptibility to smut, brown rust, orange rust, leaf scald, mosaic, and ratoon stunting for CP 72-2086, CP 78-1628, CP 89-2143, and 80 new sugarcane clones

	Parentage				Rating*					
						Rust				
Clone	Female	Male	Increase status[H]	Percent fiber	Smut	Brown	Orange	Leaf scald	Mosaic	Ratoon stunting[I]
CP 72-2086	CP 62-374	CP 63-588	Commercial	8.97	R	R	L	R	S	R
CP 78-1628	CP 65-0357	CP 68-1026	Commercial	10.39	S	S	-	L	R	R
CP 89-2143	CP 81-1254	CP 72-2086	Commercial	9.85	R	R	S	L	L	L
CP 00-1074	CP 89-2143	98 P07[,]	None	9.62	R	L	-	R	S	L
CP 00-1100	CP 89-2143	Unknown	None	8.54	R	R	R	R	S	R
CP 00-1101	CP 89-2143	CP 89-2143	Commercial	10.15	R	R	R	R	R	R
CP 00-1252	CP 90-1424	CP 92-1167	None	9.76	R	S	-	U	R	R
CP 00-1301	CP 75-1632	CP 89-2143	None	10.74	R	S	R	U	U	S
CP 00-1302	CP 75-1632	CP 89-2143	None	10.52	R	L	-	L	R	R
CP 00-1446	CP 93-1607	CP 91-1150	Commercial	8.86	U	U	L	U	L	R
CP 00-1527	CP 80-1827	CP 92-1320	None	8.96	R	L	-	R	S	S
CP 00-1630	CP 92-1167	CP 92-1320	None	10.19	R	L	R	U	U	S
CP 00-1748	CP 81-1238	CP 89-1509	None	9.73	R	S	-	R	S	R
CP 00-1751	CP 81-1238	CP 89-1509	None	8.92	R	S	-	L	L	R
CP 00-2164	US 95-1063	US 95-1127	None	9.29	R	L	-	R	L	R
CP 00-2180	HoCP 91-55	HoCP 91-552	Commercial	9.46	R	L	R	L	R	R
CP 00-2188	CP 90-1549	Unknown	None	8.68	R	L	-	R	R	R
CP 01-1178	CP 84-1198	CP 82-1172	None	9.97	R	U	R	L	L	R
CP 01-1181	CP 84-1198	CP 82-1172	None	8.01	R	L	-	L	R	L
CP 01-1205	CP 94-2095	CP 89-2143	None	8.45	L	L	-	L	S	S
CP 01-1321	CP 82-1172	CP 89-2143	None	9.39	L	S	-	S	S	R
CP 01-1338	CP 94-1200	CP 89-2143	None	9.00	R	L	-	S	L	R
CP 01-1372	CP 94-1200	CP 89-2143	Commercial	9.45	L	R	R	L	L	R
CP 01-1378	CP 94-1200	CP 89-2143	None	10.48	R	S	S	S	S	S
CP 01-1391	CP 81-1384	CP 94-1528	None	8.62	R	R	R	S	S	R
CP 01-1564	CP 93-1634	CP 89-2143	None	10.64	R	L	R	L	U	R
CP 01-1957	CP 88-1762	Unknown	None	12.47	R	R	-	S	R	S
CP 01-2056	CP 89-2143	Unknown	None	10.55	L	R	-	R	S	R
CP 01-2390	CP 95-3218	CP 94-1528	None	9.77	S	L	-	L	R	S
CP 01-2459	US 95-1023	CP 85-1308	None	11.32	L	L	R	S	S	L
CP 02-1143	CP 93-1382	CP 92-1666	None	10.80	R	L	L	L	S	R
CP 02-1458	CP 85-1382	CP 80-1743	None	11.90	R	L	L	L	R	R
CP 02-1554	CP 92-1561	CP 94-2059	None	12.13	R	L	L	R	L	R
CP 02-1564	CP 94-1528	CP 72-2086	None	9.70	R	S	L	L	L	S
CP 02-2015	CP 85-1491	CP 80-1743	None	11.84	R	L	L	L	L	U

Table 1.—continued. Parentage, fiber content, increase status, and ratings of susceptibility to smut, rust, leaf scald, mosaic, and ratoon stunting for CL 77-0797, CP 72-2086, CP 78-1628, CP 89-2143, and 80 new sugarcane clones

	Parentage				Rating*					
						Rust				
Clone	Female	Male	Increase status[H]	Percent fiber	Smut	Brown	Orange	Leaf scald	Mosaic	Ratoon stunting[I]
CP 02-2281	CP 94-1200	CP 92-1167	None	11.93	R	L	R	L	S	R
CP 03-1160	CP 92-1435	CP 92-1435	None	10.57	U	S	S	U	U	L
CP 03-1173	HoCP 85-845	HoCP 85-845	None	10.48	R	S	R	L	S	S
CP 03-1401	CP 90-1424	CP 92-1167	None	11.61	L	S	R	R	R	L
CP 03-1491	CP 92-1561	CP 92-1167	None	10.55	R	S	S	R	R	R
CP 03-1912	CP 92-1167	CP 95-1039	All	9.61	R	R	R	L	R	L
CP 03-1939	CP 82-1172	CP 95-1039	None	9.76	S	R	R	U	R	R
CP 03-2188	CP 95-1569	CP 97-1362	None	11.36	R	L	R	L	R	L
CPCL 96-0860	CL 75-0853	CL 78-1600	None	11.48	R	S	S	S	R	-
CPCL 96-2061	CL 83-3576	Mix 91V	None	10.33	R	R	R	R	R	-
CPCL 97-0393	CL 89-4294	US 87-1006	None	11.99	L	L	R	R	S	-
CPCL 97-2730	CL 75-0853	CL 88-4730	Commercial	9.52	R	R	R	L	R	-
CPCL 99-1225	CL 87-2608	CP 80-1743	None	11.52	S	S	S	R	R	L
CPCL 99-1401	CL 74-0259	CP 81-1238	None	10.67	R	U	U	S	R	R
CPCL 99-1777	CL 83-3586	CL 84-4234	None	11.05	R	S	S	R	R	R
CPCL 99-2103	CL 86-4047	CL 84-3152	None	11.99	S	S	S	R	S	S
CPCL 99-2206	CL 87-1630	CP 80-1743	None	9.66	R	S	S	S	R	S
CPCL 99-2574	CL 83-3431	Mix 98C	All	11.99	R	L	L	L	R	R
CPCL 99-4455	CL 90-4643	CP 84-1198	All	10.37	S	R	R	L	R	S
CPCL 00-0129	CL 84-3878	Mix 91V	All	9.98	R	R	R	R	R	R
CPCL 00-0458	CL 87-2882	CL 89-5189	None	10.20	U	U	U	R	R	U
CPCL 00-1373	CL 83-1900	CL 88-4730	None	12.27	R	U	R	R	R	U
CPCL 00-4027	CL 83-1364	CL 86-4590	None	11.29	R	U	U	R	R	U
CPCL 00-4111	CL 83-3431	CL 89-5189	All	11.29	R	R	U	U	R	S
CPCL 00-4611	CL 80-1575	CP 85-1491	None	12.45	U	U	R	R	R	R
CPCL 00-6131	CL 87-1630	CP 84-1198	None	11.44	S	U	U	R	S	R
CPCL 00-6756	CL 83-1364	CL 92-5431	None	12.19	R	S	S	R	R	R
CPCL 01-0271	CL 86-4340	Poly 00-3	None	10.81	R	S	S	R	U	S
CPCL 01-0571	CL 87-2944	CL 86-4590	None	11.01	U	S	S	U	S	R
CPCL 01-0877	CL 90-4725	CL 88-4730	None	10.87	R	S	R	R	R	R

* R = resistant enough for commercial production; L = low levels of disease susceptibility; S = too susceptible for production; U = undetermined susceptibility (available data not sufficient to determine the level of susceptibility).

H Commercial = Released for commercial production; None = Not considered as potential release candidate; Otherwise, increasing acreage of seed cane at all locations, locations with sand soils only, or locations with muck soils only.

I RSD can be controlled by using heat-treated or tissue-cultured vegetative planting material.

§ Mix 75b and 95 P 8 refer to polycrosses. In Mix 75b, female parent (CL 61-620) exposed to pollen from many clones, and in 95 P 16 CP 90-1535 exposed to pollen from many clones in 1995 crossing season; therefore, male parents of CL 77-0797 and CP 99-1540 unknown. Similar explanations for CP 99-1541, CP 99-1542, CP 00-1074, CPCL 96-2061, and CPCL 99-2574.

Table 2. Yields of cane in metric tons per hectare (TC/H) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck

	Mean yield by soil type, farm, and sampling date					
	Dania muck	Lauderhill muck			Pahokee muck	
Clone	Duda 1/8/08	SFI 1/3/08	Knight 1/7/08	Okeelanta 1/17/08	Osceola 1/17/08	Mean yield, all farms
CPCL 00-4111	203.62	232.51	181.48	183.06	193.65	198.86*
CP 03-2188	187.12	222.24	203.59	188.04	172.44	194.69*
CPCL 00-1373	191.90	211.43	174.30	185.63	180.20	188.69*
CPCL 00-4611	188.68	187.62	177.39	190.86	183.71	185.61*
CPCL 01-0571	187.53	195.82	162.58	180.83	162.13	177.78*
CPCL 00-6131	177.38	207.85	165.36	178.03	146.47	175.02*
CP 03-1160	128.30	153.99	195.57	201.69	193.59	174.63
CPCL 01-0271	193.02	172.27	170.91	154.70	168.23	171.82
CPCL 00-0458	171.52	200.68	152.26	166.26	166.21	171.38
CP 78-1628	183.53	-----	176.03	151.28	156.11	171.08
CPCL 00-6756	176.00	184.76	141.77	164.74	160.99	165.65
CPCL 00-4027	176.77	177.58	169.88	162.74	139.66	165.15
CP 89-2143	143.63	184.51	-----	160.43	148.66	158.03
CP 72-2086	174.28	165.71	154.96	139.48	143.51	155.59
CPCL 00-0129	169.67	188.79	149.18	144.48	123.52	155.06
CP 03-1491	136.38	177.27	123.03	121.41	102.91	132.31
Mean	174.33	190.87	166.55	167.10	158.87	171.33
LSD ($p = 0.1$)†	20.43	23.50	22.03	15.16	18.08	16.62
CV (%)	12.19	12.79	13.73	9.44	8.31	12.11

* Significantly greater than CP 89-2143 at $p = 0.10$ based on t test.
† *LSD* for location means of cane yield = 9.43 TC/H at $p = 0.10$.

Table 3. Preharvest yields of theoretical recoverable 96^{o} sugar in kg per metric ton of cane (KS/T) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck

	Mean yield by soil type, farm, and sampling date					
	Dania muck	Lauderhill muck			Pahokee muck	
Clone	Duda 10/9/07	Okeelanta 10/11/07	Knight 10/12/07	SFI 10/12/07	Osceola 10/12/07	Mean yield, all farms
CPCL 00-4111	89.7	101.3	107.1	102.4	104.6	99.6
CPCL 01-0271	101.3	102.9	97.8	105.3	91.7	99.3
CP 89-2143	97.1	109.8	-----	92.2	93.9	97.4
CPCL 00-0458	92.1	107.0	94.8	97.6	98.8	95.8
CPCL 00-0129	93.1	92.5	102.3	97.5	92.5	95.2
CP 72-2086	88.1	99.9	103.8	89.8	99.0	94.3
CP 03-1160	97.1	97.7	86.7	102.8	86.6	93.9
CPCL 00-1373	93.0	93.5	89.1	89.9	95.7	93.0
CP 03-1491	91.5	104.9	84.1	77.2	99.3	92.2
CPCL 00-6756	94.4	105.3	88.1	82.4	88.5	91.8
CPCL 00-4611	85.7	100.2	91.7	89.9	89.4	90.4
CPCL 00-4027	89.3	89.6	88.2	93.3	99.0	90.1
CP 03-2188	88.2	78.9	88.7	101.0	87.0	89.2
CPCL 01-0571	94.8	83.2	89.7	86.1	92.8	87.2
CP 78-1628	90.7	81.5	89.1	-----	86.8	86.6
CPCL 00-6131	82.5	92.8	91.2	74.4	82.1	84.3
Mean	91.8	96.3	92.8	92.1	93.0	92.5
LSD (p = 0.1)†	9.5	19.0	12.9	16.4	33.0	4.7
CV (%)	5.9	8.6	7.8	10.1	6.8	7.9

† *LSD* for location means of sugar yield = 2.6 KS/T at p = 0.10.

Table 4. Yields of theoretical recoverable 96^{o} sugar in kg per metric ton of cane (KS/T) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck

	Mean yield by soil type, farm, and sampling date					
	Dania muck	Lauderhill muck			Pahokee muck	
Clone	Duda 1/8/08	SFI 1/3/08	Knight 1/7/08	Okeelanta 1/17/08	Osceola 1/17/08	Mean yield, all farms
CPCL 00-4027	125.0	120.3	119.7	-----	129.6	124.0
CPCL 00-0129	120.8	119.7	124.6	120.6	128.7	122.8
CP 89-2143	119.9	122.5	-----	123.8	123.9	121.2
CPCL 01-0271	114.6	118.1	111.6	122.1	123.6	118.0
CP 72-2086	116.5	118.7	113.5	120.0	120.3	117.8
CPCL 00-4111	113.6	120.9	108.8	117.8	122.3	116.7
CPCL 01-0571	116.5	119.9	116.1	108.3	121.9	116.5
CP 78-1628	113.8	-----	110.3	120.4	119.5	116.2
CPCL 00-6756	113.2	118.3	110.3	122.9	114.7	115.9
CP 03-1491	115.5	114.8	105.5	120.3	121.9	115.6
CP 03-2188	116.0	122.6	112.2	89.4	125.1	113.1
CP 03-1160	109.8	110.6	105.7	118.9	119.9	113.0
CPCL 00-6131	113.3	110.6	100.0	121.8	119.5	113.0
CPCL 00-4611	106.2	115.0	103.3	117.1	112.6	110.8
CPCL 00-0458	108.7	111.5	102.9	116.0	113.6	110.5
CPCL 00-1373	106.7	111.0	102.9	114.5	114.8	110.0
Mean	114.4	117.0	109.8	117.5	120.7	115.9
LSD (p = 0.1)†	4.1	5.5	5.8	4.4	3.6	5.3
CV (%)	3.8	4.9	5.5	3.9	3.1	4.3

† *LSD* for location means of sugar yield = 2.0 KS/T at p = 0.10.

Table 5. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck

	Mean yield by soil type, farm, and sampling date					
	Dania muck	Lauderhill muck			Pahokee muck	
Clone	Duda 1/8/08	SFI 1/3/08	Knight 1/7/08	Okeelanta 1/17/08	Osceola 1/17/08	Mean yield, all farms
CPCL 00-4111	23.161	28.107	19.577	21.589	23.714	23.229*
CP 03-2188	21.734	27.256	22.744	16.940	21.566	22.048*
CPCL 00-1373	20.465	23.560	17.850	21.262	20.669	20.761
CPCL 01-0571	21.802	23.514	18.949	19.625	19.763	20.731
CPCL 00-4611	20.035	21.588	17.733	22.351	20.701	20.493
CPCL 00-4027	22.143	21.397	20.208	20.412	18.096	20.437
CPCL 01-0271	22.135	20.528	19.082	18.930	20.853	20.306
CP 78-1628	20.917	-----	19.433	18.219	18.655	19.864
CP 03-1160	14.109	17.167	20.580	23.979	23.249	19.817
CPCL 00-6131	20.095	22.824	16.607	21.669	17.517	19.742
CPCL 00-6756	19.925	21.824	15.657	20.247	18.360	19.206
CP 89-2143	17.236	22.613	-----	19.863	18.438	19.170
CPCL 00-0129	20.465	22.601	18.511	17.452	15.886	18.971
CPCL 00-0458	18.606	22.362	15.661	19.304	18.848	18.956
CP 72-2086	20.296	19.671	17.611	16.749	17.267	18.319
CP 03-1491	15.728	20.396	12.983	14.612	12.528	15.259
Mean	19.928	22.361	18.212	19.575	19.132	19.832
LSD (p = 0.1)†	2.447	3.052	2.640	2.094	2.314	2.189
CV (%)	12.772	14.181	15.050	11.125	12.578	13.207

***** Significantly greater than CP 89-2143 at $p = 0.10$ based on *t* test.
† *LSD* for location means of sugar yield = 1.126 TS/H at $p = 0.10$.

Table 6. Yields of preharvest and harvest theoretical recoverable 96^{o} sugar in kg per metric ton of cane (KS/T) from plant cane on Malabar sand and Pompano fine sand

	Preharvest yield by soil type, farm, and sampling date			Harvest yield by soil type, farm, and sampling date		
	Malabar sand	Pompano fine sand		Malabar sand	Pompano fine sand	
Clone	**Hilliard 10/10/07**	**Lykes 10/10/07**	**Mean yield, both farms**	**Hilliard 1/14/08**	**Lykes 1/15/08**	**Mean yield, both farms**
CPCL 01-0571	116.2	106.4	111.3	131.3	139.3	135.3
CP 89-2143	110.7	-----	108.8	127.5	-----	131.8
CPCL 00-4027	107.1	92.7	99.9	132.0	130.2	131.1
CP 03-1401	110.3	106.8	108.5	124.8	137.2	131.0
CPCL 00-6131	109.0	96.3	102.7	124.8	134.3	129.6
CP 03-1160	106.4	93.8	100.1	127.7	129.1	128.4
CP 03-2188	112.7	106.4	109.5	131.4	125.4	128.4
CP 72-2086	109.9	91.9	99.9	126.3	130.1	128.3
CPCL 01-0877	108.1	85.5	96.8	132.7	123.1	127.9
CP 78-1628	107.0	111.9	109.4	125.5	128.7	127.1
CP 03-1491	113.0	100.3	106.6	127.2	125.3	126.2
CP 03-1173	93.2	88.3	91.6	123.5	127.7	125.7
CP 03-1912	97.3	96.0	96.6	123.6	124.1	123.9
CPCL 00-1373	109.0	94.4	101.7	118.7	124.1	121.4
CPCL 01-0271	108.4	73.4	90.9	126.1	113.5	119.8
CP 03-1939	102.1	94.4	98.2	117.3	116.8	117.1
Mean	107.5	95.9	102.0	126.3	127.2	127.0
LSD (p = 0.1)†	9.6	17.3	11.6	3.7	7.1	8.4
CV (%)	5.1	10.2	7.9	3.1	5.8	4.6

† *LSD* for location means of preharvest sugar yield = 22.2 KS/T and of harvest sugar yield = 1.5 KS/T at p = 0.10.

Table 7. Yields of cane and theoretical recoverable 96° sugar in metric tons per hectare (TC/H and TS/H) from plant cane on Malabar sand and Pompano fine sand

	Cane yield by soil type, farm, and sampling date			Sugar yield by soil type, farm, and sampling date		
	Malabar sand	Pompano fine sand		Malabar sand	Pompano fine sand	
Clone	**Hilliard 10/10/07**	**Lykes 10/10/07**	**Mean yield, both farms**	**Hilliard 1/14/08**	**Lykes 1/15/08**	**Mean yield, both farms**
CP 03-1912	201.25	52.86	127.06*	24.890	6.429	15.660*
CP 03-1160	151.91	57.07	104.49	19.380	7.311	13.346
CPCL 01-0877	156.65	37.39	97.02	20.777	4.647	12.712
CP 03-2188	141.86	40.19	91.02	18.582	5.189	11.885
CP 89-2143	135.52	-----	91.32	17.320	-----	11.880
CP 03-1173	135.83	44.79	90.60	16.746	5.703	11.270
CPCL 00-4027	131.76	39.60	85.68	17.406	5.120	11.263
CPCL 00-6131	144.78	30.90	87.84	18.069	4.062	11.065
CPCL 00-1373	143.03	40.57	91.80	16.952	4.986	10.969
CPCL 01-0571	131.17	30.16	80.66	17.186	4.257	10.721
CPCL 01-0271	135.93	22.48	79.20	17.138	2.553	9.846
CP 78-1628	120.87	31.87	76.37	15.239	4.181	9.710
CP 72-2086	116.05	34.76	76.12	14.607	4.562	9.689
CP 03-1491	109.98	38.12	74.05	13.999	4.904	9.452
CP 03-1401	101.83	35.87	68.85	12.707	4.802	8.754
CP 03-1939	97.02	46.56	71.79	11.365	5.591	8.478
Mean	134.71	38.88	87.12	17.023	4.953	11.044
LSD (p = 0.1)†	17.86	16.14	28.47	3.969	2.007	3.826
CV (%)	13.78	43.13	20.00	14.429	42.111	20.325

***** Significantly greater than CP 78-1628 at p = 0.10 based on t test.
† *LSD* for location means of cane yield = 27.16 TC/H and of sugar yield = 3.455 TS/H at p = 0.10.

Table 8. Yields of preharvest and harvest theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from plant cane on Lauderhill muck and Torry muck

	Preharvest yield by soil type, farm, and sampling date			Harvest yield by soil type, farm, and sampling date		
	Lauderhill muck	Torry muck		Lauderhill muck	Torry muck	
Clone	Okeelanta 10/11/07	Eastgate 10/9/07	Mean yield, both farms	Okeelanta 1/24/08	Eastgate 2/4/08	Mean yield, both farms
CPCL 99-4455	118.2	120.7	119.5	135.1	134.4	134.7*
CPCL 99-1401	103.9	116.0	109.9	135.2	129.3	132.3
CPCL 99-2574	97.9	122.6	110.2	134.5	129.7	132.1
CP 89-2143	100.6	117.5	109.1	131.0	128.4	129.7
CP 72-2086	103.5	116.2	109.9	126.1	131.9	129.0
CPCL 99-2103	86.6	108.8	97.7	128.7	128.0	128.4
CP 78-1628	92.0	117.6	104.8	130.2	126.2	128.2
CPCL 99-1225	94.5	114.6	104.5	127.1	125.6	126.4
CP 02-2015	104.6	97.2	100.9	126.1	121.2	123.7
CPCL 99-2206	93.7	112.0	102.8	123.3	121.4	122.3
CP 02-1143	97.1	108.0	102.6	123.3	118.9	121.1
CPCL 99-1777	92.6	116.9	104.8	121.9	120.3	121.1
CP 02-1554	97.2	107.2	102.2	120.7	121.2	121.0
CP 02-2281	94.8	118.6	106.7	118.1	122.9	120.5
CP 02-1564	95.9	129.5	112.7	124.2	116.2	120.2
CP 02-1458	99.7	101.9	100.8	116.7	120.5	118.6
Mean	98.3	114.1	106.2	126.4	124.7	125.8
LSD (p = 0.1)†	12.7	12.8	13.1	3.5	4.1	4.8
CV (%)	7.4	6.4	13.5	2.9	3.4	3.2

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of preharvest sugar yield = 7.2 KS/T and of harvest yield = 1.73 KS/T at p = 0.10.

Table 9. Yields of cane and of theoretical recoverable 96^{o} sugar in metric tons per hectare (TC/H and TS/H) from plant cane on Lauderhill muck and Torry muck

	Cane yield by soil type, farm, and sampling date			Sugar yield by soil type, farm, and sampling date		
	Lauderhill muck	Torry muck		Lauderhill muck	Torry muck	
Clone	Okeelanta 1/24/08	Eastgate 2/4/08	Mean yield, both farms	Okeelanta 1/24/08	Eastgate 2/4/08	Mean yield, both farms
CP 02-1143	116.50	276.87	196.68	14.779	34.755	24.767
CP 02-1458	110.02	263.04	186.53	14.723	34.025	24.374
CP 02-1554	141.94	218.90	180.42	19.139	28.290	23.715
CP 02-1564	101.87	271.98	186.92	12.255	33.028	22.642
CP 02-2015	111.94	264.72	188.33	13.785	31.465	22.625
CP 02-2281	90.97	253.83	172.40	11.416	33.441	22.429
CP 72-2086	68.11	278.06	173.09	8.801	35.556	22.178
CP 78-1628	93.32	268.49	180.90	11.494	32.574	22.034
CP 89-2143	117.93	246.94	182.43	14.617	28.673	21.645
CPCL 99-1225	119.08	209.36	164.22	15.449	26.416	20.932
CPCL 99-1401	107.60	225.20	166.40	12.694	27.724	20.209
CPCL 99-1777	89.04	242.86	165.95	10.829	29.302	20.065
CPCL 99-2103	75.07	222.29	148.68	10.183	29.868	20.025
CPCL 99-2206	100.86	214.63	157.75	12.667	25.838	19.252
CPCL 99-2574	68.58	223.31	145.94	9.036	28.761	18.898
CPCL 99-4455	81.96	186.34	134.15	9.695	22.451	16.073
Mean	99.67	241.68	170.67	12.598	30.135	21.366
LSD (p = 0.1)†	24.63	36.38	42.62	3.122	4.655	5.737
CV (%)	25.70	15.66	18.93	25.774	16.063	19.290

† *LSD* for location means of cane yield = 21.52 TC/H and of sugar yield = 2.648 TS/H at p = 0.10.

Table 10. Yields of cane in metric tons per hectare (TC/H) from first-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Dania muck	Lauderhill muck				Pahokee muck	Malabar sand	Pompano fine sand	
Clone	**Duda 12/10/07**	**Okeelanta 10/26/07**	**Knight 12/3/07**	**Wedgworth 12/11/07**	**SFI 12/15/07**	**Osceola 12/18/07**	**Hilliard 1/14/08**	**Lykes 12/19/07**	**Estimated yield, all farms**
CP 02-1564	179.70	169.39	136.56	209.76	187.27	172.54	76.86	89.77	152.28*
CPCL 99-2206	177.45	148.54	102.63	174.65	158.60	168.92	139.39	99.28	146.47*
CPCL 99-1401	141.74	154.97	109.83	173.24	158.48	154.19	92.85	95.66	134.71*
CP 02-1143	143.87	156.17	88.05	145.40	192.69	157.80	65.83	97.85	131.22*
CPCL 99-2103	150.36	155.73	123.29	142.66	164.17	154.38	50.48	85.67	127.59*
CP 78-1628	135.39	141.26	-----	-----	-----	146.78	82.04	98.97	127.35*
CP 02-1554	135.94	154.42	87.92	148.97	162.00	141.07	73.86	100.47	125.70
CPCL 99-1777	147.60	147.78	83.37	139.23	170.91	142.45	77.19	94.15	125.58
CP 02-2015	150.73	161.31	80.40	160.65	177.75	135.97	62.08	65.59	124.60
CP 02-2281	152.54	136.66	87.42	154.75	168.26	138.90	59.78	81.67	122.55
CPCL 99-1225	150.39	146.95	93.24	146.87	157.45	140.43	57.47	55.79	118.64
CPCL 99-2574	148.15	135.55	74.76	145.32	170.39	142.47	62.93	53.83	117.02
CP 89-2143	-----	130.30	-----	-----	150.47	127.78	75.22	80.21	115.28
CPCL 99-4455	141.01	138.23	59.13	126.68	143.55	135.84	55.98	51.07	106.82
CP 02-1458	113.53	113.86	60.58	130.74	166.49	134.97	53.84	58.30	104.39
CP 72-2086	123.88	139.13	58.74	92.59	152.01	111.58	-----	67.33	99.27
Mean	146.01	146.26	88.93	149.13	167.07	144.93	71.98	80.79	123.72
LSD (p = 0.1)†	21.12	17.96	25.47	19.31	22.49	18.74	37.60	16.88	10.98
CV (%)	15.03	12.77	23.99	13.44	13.98	13.45	54.27	21.72	19.09

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield = 13.75 TC/H at p = 0.10.

Table 11. Yields of theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from first-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Dania muck	Lauderhill muck				Pahokee muck	Malabar sand	Pompano fine sand	
Clone	Duda 12/10/07	Okeelanta 10/26/07	Knight 12/3/07	Wedgworth 12/11/07	SFI 12/15/07	Osceola 12/18/07	Hilliard 1/14/08	Lykes 12/19/07	Estimated yield, all farms
CPCL 99-4455	129.1	124.7	123.7	128.6	128.0	131.3	139.8	133.6	129.9*
CPCL 99-2103	121.8	108.5	124.4	119.8	118.4	126.8	137.7	132.6	123.7
CPCL 99-2574	122.6	112.9	117.8	119.2	120.7	124.6	138.7	130.2	123.4
CP 89-2143	-----	109.8	-----	-----	119.4	121.9	134.2	131.4	121.7
CP 02-1564	118.8	111.4	116.9	120.6	118.7	121.1	135.3	128.4	121.4
CP 72-2086	118.6	111.0	117.7	116.4	117.7	122.9	-----	126.6	120.8
CP 78-1628	119.0	107.5	-----	-----	-----	122.4	138.5	123.5	120.1
CPCL 99-1401	125.0	93.6	120.8	117.6	114.7	122.1	137.1	130.5	120.0
CP 02-1143	116.6	101.8	112.6	109.9	117.1	117.0	133.0	126.4	116.8
CP 02-2015	117.3	105.6	115.0	112.6	119.0	114.8	127.5	117.5	116.1
CP 02-1554	113.0	105.0	114.0	104.4	110.1	119.0	132.4	127.3	115.6
CP 02-2281	122.0	106.1	107.9	110.0	114.6	121.1	114.5	124.7	115.2
CPCL 99-1225	114.0	101.9	105.7	111.5	110.2	111.5	131.5	121.4	113.6
CPCL 99-2206	111.7	95.4	113.1	108.6	107.9	113.8	134.6	123.5	113.5
CP 02-1458	109.8	100.0	109.5	105.9	112.7	107.7	131.8	123.4	112.5
CPCL 99-1777	112.2	95.1	100.8	109.1	117.0	109.3	130.3	123.2	112.3
Mean	118.1	105.6	114.3	113.9	116.4	119.2	133.1	126.5	118.5
LSD (p = 0.1)†	5.2	6.3	5.5	4.9	5.8	4.7	11.5	3.3	3.2
CV (%)	4.5	6.2	4.1	4.5	5.2	4.1	9.0	2.7	5.5

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield = 2.6 KS/T at p = 0.10.

Table 12. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from first-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Dania muck	Lauderhill muck				Pahokee muck	Malabar sand	Pompano fine sand	
Clone	**Duda 12/10/07**	**Okeelanta 10/26/07**	**Knight 12/3/07**	**Wedgworth 12/11/07**	**SFI 12/15/07**	**Osceola 12/18/07**	**Hilliard 1/14/08**	**Lykes 12/19/07**	**Estimated yield, all farms**
CP 02-1564	21.377	18.857	15.922	25.233	22.266	20.908	10.427	11.534	18.278*
CPCL 99-2206	19.811	14.248	11.637	18.976	17.230	19.211	18.693	12.272	16.534*
CPCL 99-1401	17.733	-----	13.172	20.429	18.423	18.757	12.778	12.538	16.000*
CPCL 99-2103	18.363	16.936	15.325	17.148	19.710	19.633	7.032	11.349	15.600*
CP 78-1628	16.236	15.192	-----	-----	-----	17.989	11.400	12.165	15.213
CP 02-1143	16.702	15.872	9.961	16.008	22.678	18.466	8.792	12.600	15.138
CPCL 99-2574	18.116	15.361	8.909	17.265	20.616	17.758	8.738	7.605	14.406
CP 02-2015	17.741	17.051	9.286	18.066	21.162	15.664	7.917	7.677	14.349
CP 02-1554	15.230	16.273	9.991	15.534	17.932	16.808	9.836	12.811	14.312
CP 02-2281	18.614	14.500	9.461	16.979	19.276	16.814	7.399	10.139	14.167
CPCL 99-1777	16.573	14.111	8.437	15.154	20.067	15.500	10.033	11.609	13.975
CP 89-2143	-----	14.323	-----	-----	17.990	15.480	10.161	10.530	13.882
CPCL 99-4455	18.169	17.215	7.265	16.283	18.514	17.841	7.823	6.904	13.816
CPCL 99-1225	17.177	14.984	9.863	16.365	17.368	15.586	7.553	6.746	13.220
CP 72-2086	14.395	15.475	6.898	10.817	17.921	13.686	-----	8.530	11.866
CP 02-1458	12.429	11.397	6.683	13.888	18.987	14.540	7.120	7.189	11.558
Mean	17.244	15.453	10.201	17.010	19.343	17.165	9.713	10.137	14.520
LSD ($p = 0.1$)†	2.683	2.294	2.964	2.318	3.175	2.416	5.070	2.178	1.519
CV (%)	16.162	15.440	24.341	14.142	17.051	14.650	54.240	22.321	21.349

***** Significantly greater than CP 89-2143 at $p = 0.10$ based on *t* test.
† *LSD* for location means of cane yield = 1.812 TS/H at $p = 0.10$.

Table 13. Yields of cane in metric tons per hectare (TC/H) and theoretical recoverable 96^{o} sugar in kg per metric ton (KS/T) and in metric tons per hectare (TS/H) from first-ratoon cane on Dania muck and Torry muck

	Cane yield (TC/H) by soil type, farm, and sampling date			Sugar yield (KS/T) by soil type, farm, and sampling date			Sugar yield (TS/H) by soil type, farm, and sampling date		
	Dania muck	Torry muck		Dania muck	Torry muck		Dania muck	Torry muck	
Clone	Okeelanta 12/27/07	Eastgate 1/28/08	Mean yield, both farms	Okeelanta 12/27/07	Eastgate 1/28/08	Mean yield, both farms	Okeelanta 12/27/07	Eastgate 1/28/08	Mean yield, both farms
CP 01-1378	125.91	273.27	228.20*	126.5	122.2	123.6	15.955	33.260	27.941*
CP 01-1372	159.01	242.42	206.58*	135.6	123.2	128.8	21.569	29.918	26.327*
CP 01-2390	159.79	244.45	208.04*	123.5	119.7	121.4	19.782	29.266	25.159*
CP 01-1564	131.65	261.20	198.24*	122.0	121.0	121.6	16.057	31.575	24.008*
CP 78-1628	143.67	232.51	194.20*	120.6	121.7	121.2	17.194	28.263	23.436
CP 01-1338	143.98	230.04	193.00*	110.2	124.0	117.7	15.886	28.581	23.014
CP 01-1205	128.38	197.53	168.17	131.8	132.1	131.9	16.914	26.086	22.121
CP 01-1957	123.37	234.32	185.97	108.1	122.2	115.8	13.357	28.720	21.941
CP 01-2459	123.30	209.18	172.22	120.7	120.8	120.8	14.880	25.280	20.757
CP 89-2143	110.23	195.40	158.76	125.5	126.2	125.9	13.838	24.635	19.931
CP 01-2056	117.28	205.97	167.73	120.1	116.7	118.2	14.082	24.034	19.714
CP 01-1391	110.99	205.10	164.40	114.0	115.1	114.6	12.672	23.831	18.962
CP 01-1178	115.77	164.17	147.90	128.5	126.5	127.3	14.933	20.727	18.733
CP 72-2086	81.28	188.77	141.99	120.9	128.9	125.3	9.835	24.360	17.961
CP 01-1321	119.89	159.43	143.54	118.9	127.2	123.4	14.260	20.181	17.693
CP 01-1181	90.49	164.03	132.68	125.1	126.7	126.0	11.373	20.782	16.709
Mean	124.06	212.99	175.73	122.0	123.4	122.7	15.162	26.219	21.525
LSD (p = 0.1)†	18.07	35.82	31.09	3.9	4.6	8.3	2.230	4.691	3.902
CV (%)	15.09	17.49	17.45	3.3	3.9	3.7	15.234	26.477	17.934

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield = 49.20 TC/H of sugar yield = 1.2 KS/T, and of sugar yield = 6.120 TS/H at p = 0.10.

Table 14. Yields of cane in metric tons per hectare (TC/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Dania muck	Lauderhill muck			Pahokee muck	Malabar sand	Pompano fine sand	
Clone	Okeelanta 10/15/07	Knight 10/16/07	Wedgworth 10/19/07	Duda 10/22/07	Osceola 10/17/07	Hilliard 10/25/07	Lykes 10/24/07	Mean yield, all farms
CP 01-1372	129.35	115.82	196.09	171.76	164.43	150.15	67.20	141.94*
CP 01-1957	119.06	152.02	190.55	140.67	112.44	124.26	38.37	125.87*
CP 01-1378	92.52	128.50	158.26	151.46	124.65	120.83	73.99	121.25*
CP 01-2390	94.28	113.65	148.72	157.61	109.97	133.62	81.02	119.24
CP 01-1338	110.02	60.50	163.78	158.72	127.67	-----	73.91	116.52
CP 01-2056	98.94	116.55	146.44	146.28	114.11	104.35	54.45	111.31
CP 78-1628	89.69	-----	-----	150.38	100.68	98.76	79.83	108.08
CP 01-1564	89.72	98.82	137.50	125.45	94.80	132.11	62.20	105.92
CP 89-2143	75.14	-----	-----	116.74	122.30	125.88	64.35	105.50
CP 01-2459	69.46	92.22	146.10	110.77	78.21	103.36	72.35	96.22
CP 01-1391	74.89	46.37	132.37	124.02	115.11	103.74	60.01	93.20
CP 01-1205	83.81	88.91	117.61	118.24	83.42	106.80	55.74	93.10
CP 01-1321	74.49	35.32	148.63	108.18	86.30	105.84	68.13	89.62
CP 72-2086	68.16	48.98	115.27	104.60	-----	-----	49.19	78.37
CP 01-1178	54.88	21.61	98.31	66.87	54.11	59.79	58.57	59.53
CP 01-1181	49.86	24.19	88.05	70.27	59.01	64.84	53.90	58.13
Mean	85.89	81.68	141.98	126.38	103.15	109.59	63.32	101.49
LSD (p = 0.1)†	25.96	23.00	26.26	23.04	27.87	19.28	16.84	15.19
CV (%)	31.44	29.25	19.22	18.76	28.07	18.16	27.64	24.31

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
† *LSD* for location means of sugar yield = 12.40 TC/H at p = 0.10.

Table 15. Yields of theoretical recoverable 96^{o} sugar in kg per metric ton (KS/T) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Dania muck	Lauderhill muck			Pahokee muck	Malabar sand	Pompano fine sand	
Clone	Okeelanta 10/15/07	Knight 10/16/07	Wedgworth 10/19/07	Duda 10/22/07	Osceola 10/17/07	Hilliard 10/25/07	Lykes 10/24/07	Mean yield, all farms
CP 01-1205	132.9	110.5	105.6	107.9	127.5	136.4	128.2	121.5
CP 01-1181	125.5	104.7	109.8	110.5	127.9	134.4	120.0	118.8
CP 01-1372	128.9	116.4	109.0	101.2	114.6	135.4	121.7	118.4
CP 01-1378	126.1	114.9	102.3	109.5	126.0	128.0	108.2	116.3
CP 89-2143	124.1	-----	-----	108.6	116.7	127.3	120.1	116.0
CP 01-1564	117.3	108.2	103.6	103.3	115.2	145.8	114.3	115.5
CP 72-2086	126.7	111.0	99.9	106.5	-----	-----	100.6	113.3
CP 01-2390	117.3	106.1	106.9	108.7	119.9	127.3	107.0	113.1
CP 01-1178	121.5	98.9	101.9	100.7	121.8	129.6	114.6	112.8
CP 78-1628	118.4	-----	-----	105.1	118.3	127.0	106.6	111.6
CP 01-2056	118.4	108.5	95.7	98.9	110.4	127.9	106.6	109.5
CP 01-2459	112.8	102.3	99.4	96.1	112.7	122.0	103.6	107.0
CP 01-1321	115.8	84.4	94.6	101.8	125.1	118.4	108.6	106.8
CP 01-1391	118.3	96.0	105.8	99.7	118.6	121.0	79.4	106.1
CP 01-1338	111.8	104.2	95.1	81.5	108.5	-----	105.0	103.9
CP 01-1957	103.3	97.1	88.9	77.4	88.0	109.4	109.5	96.5
Mean	119.9	104.5	101.3	101.1	116.7	127.8	109.6	111.7
LSD (p = 0.1)†	7.8	7.2	7.9	7.7	6.3	11.3	12.1	5.6
CV (%)	6.7	7.2	8.1	7.8	5.6	9.1	11.5	8.2

† *LSD* for location means of sugar yield = 2.9 KS/T at p = 0.10.

Table 16. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, Malabar sand, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Dania muck	Lauderhill muck			Pahokee muck	Malabar sand	Pompano fine sand	
Clone	Okeelanta 10/15/07	Knight 10/16/07	Wedgworth 10/19/07	Duda 10/22/07	Osceola 10/17/07	Hilliard 10/25/07	Lykes 10/24/07	Mean yield, all farms
CP 01-1372	16.566	13.495	21.337	17.610	18.978	20.321	7.902	16.607*
CP 01-1378	11.853	14.738	16.235	16.637	15.625	15.334	7.940	14.009*
CP 01-2390	11.153	12.019	15.951	17.174	13.191	16.941	8.581	13.480
CP 89-2143	9.342	-----	-----	12.737	14.281	16.009	7.801	12.205
CP 01-1564	10.607	10.666	14.333	13.034	10.799	18.503	7.040	12.157
CP 01-2056	11.721	12.643	14.010	14.554	12.541	13.270	5.777	12.046
CP 78-1628	10.603	-----	-----	15.733	11.910	12.897	8.413	12.033
CP 01-1957	12.271	14.861	16.922	10.862	9.913	13.636	3.994	11.870
CP 01-1338	12.406	6.350	15.373	12.898	13.615	-----	7.763	11.836
CP 01-1205	11.107	9.862	12.390	12.955	10.783	14.699	6.828	11.163
CP 01-2459	7.860	9.453	14.500	10.925	8.792	12.688	7.459	10.252
CP 01-1391	8.973	4.480	14.117	12.392	13.788	12.794	4.583	10.155
CP 01-1321	8.401	3.034	14.028	11.035	10.785	12.490	7.239	9.569
CP 72-2086	8.675	5.478	11.560	11.039	-----	-----	4.913	8.916
CP 01-1181	6.257	2.679	9.567	7.800	7.583	8.479	6.678	6.957
CP 01-1178	6.694	2.183	10.013	6.767	6.648	7.902	6.752	6.750
Mean	10.281	8.710	14.310	12.759	11.949	13.997	6.854	11.250
LSD ($p = 0.1$)†	3.134	2.528	2.850	2.760	3.353	2.245	1.876	1.704
CV (%)	31.699	30.157	20.692	22.279	29.153	16.562	28.438	25.388

* Significantly greater than CP 89-2143 at $p = 0.10$ based on t test.
† LSD for location means of sugar yield = 1.399 TS/H at $p = 0.10$.

Table 17. Yields of cane in metric tons per hectare (TC/H) and theoretical recoverable 96^{o} sugar in kg per metric ton (KS/T) and in metric tons per hectare (TS/H) from first-ratoon cane on Dania muck and Torry muck

	Cane yield (TC/H) by soil type, farm, and sampling date			Sugar yield (KS/T) by soil type, farm, and sampling date			Sugar yield (TS/H) by soil type, farm, and sampling date		
	Dania muck	Torry muck		Dania muck	Torry muck		Dania muck	Torry muck	
Clone	Okeelanta 10/18/07	Eastgate 10/23/07	Mean yield, both farms	Okeelanta 10/18/07	Eastgate 10/23/07	Mean yield, both farms	Okeelanta 10/18/07	Eastgate 10/23/07	Mean yield, both farms
CP 00-1074	114.62	174.33	144.48	123.0	101.6	112.3	14.086	17.744	15.915
CP 00-1751	90.91	173.96	132.43	127.9	115.7	121.8	11.580	20.113	15.846
CP 00-1101	92.15	188.46	140.30	120.4	108.8	114.6	11.050	20.528	15.789
CP 00-1302	99.81	180.19	140.00	116.4	106.5	111.5	11.695	19.179	15.437
CP 00-1100	90.36	185.12	137.74	121.6	104.1	112.9	10.937	18.989	14.963
CP 89-2143	101.78	158.15	129.96	122.2	107.5	114.9	12.419	17.219	14.819
CP 00-1748	104.48	166.70	135.59	113.9	100.6	107.2	11.924	16.863	14.394
CP 00-1630	94.66	-----	127.49	120.5	-----	112.9	11.549	-----	14.252
CP 00-1252	83.99	166.53	125.26	122.6	107.4	115.0	10.318	17.851	14.085
CP 00-1301	85.92	162.77	124.34	116.2	110.6	113.4	10.114	18.015	14.064
CP 00-1446	108.44	164.18	136.31	110.1	93.7	101.9	11.900	15.583	13.741
CP 72-2086	99.49	142.99	121.24	120.2	104.2	112.2	12.022	14.844	13.433
CP 00-2180	97.93	162.04	129.98	113.9	90.7	102.3	11.063	14.945	13.004
CP 00-1527	91.84	127.95	109.89	127.6	103.0	115.3	11.743	13.220	12.481
CP 00-2188	62.31	138.76	100.53	118.4	93.6	106.0	7.347	13.058	10.203
CP 00-2164	67.02	90.54	78.78	114.3	110.2	112.3	7.664	9.956	8.810
Mean	92.86	158.84	125.89	119.3	103.9	111.7	11.088	16.540	13.827
LSD (p = 0.1)†	19.19	28.50	26.22	6.7	7.8	7.9	2.309	3.192	3.143
CV (%)	21.49	18.65	19.93	5.9	7.8	6.8	21.654	20.051	20.825

† *LSD* for location means of cane yield = 19.55 TC/H, of sugar yield = 3.6 KS/T, and of sugar yield = 2.472 TS/H at p = 0.10.

Table 18. Rankings of clones and percent rating of CP 89-2143, by series, of damage to juice quality by cold temperatures

CP 00 series			CP 01 series			CP 02 and CPCL 99 series			CP 03, CPCL 00, and CPCL 01 series		
Clone	**Rank†**	**% of CP 89-2143**	**Clone**	**Rank**	**% of CP 89-2143**	**Clone**	**Rank**	**% of CP 89-2143**	**Clone**	**Rank**	**% of CP 89-2143**
CP 72-2086	12	88.0	CP 72-2086	12	92.6	CP 72-2086	14	92.6	CP 72-2086	21	81.8
CP 89-2143	3	100.0	CP 78-1628	1	104.1	CP 78-1628	1	104.1	CP 78-1628	7	108.9
CP 00-1074	15	85.4	CP 89-2143	4	100.0	CP 89-2143	5	100.0	CP 89-2143	11	100.0
CP 00-1100	10	93.7	CP 01-1178	7	98.7	CP 02-1143	13	92.7	CP 03-1160	16	92.6
CP 00-1101	2	102.1	CP 01-1181	14	90.3	CP 02-1458	7	98.2	CP 03-1173	17	91.8
CP 00-1252	4	99.6	CP 01-1205	6	99.3	CP 02-1554	4	100.3	CP 03-1401	12	99.0
CP 00-1301	1	102.3	CP 01-1321	11	92.7	CP 02-1564	6	99.6	CP 03-1491	14	94.5
CP 00-1302	13	85.9	CP 01-1338	15	87.3	CP 02-1582	15	89.5	CP 03-1912	6	110.2
CP 00-1446	11	88.7	CP 01-1372	3	100.3	CP 02-1736	9	95.8	CP 03-1939	19	86.4
CP 00-1527	7	94.7	CP 01-1378	10	96.1	CP 02-2015	12	93.2	CP 03-2188	20	85.4
CP 00-1630	6	97.0	CP 01-1391	16	81.9	CP 02-2281	17	84.1	CPCL 00-0458	1	124.5
CP 00-1748	5	98.8	CP 01-1564	9	98.3	CPCL 99-1225	10	95.4	CPCL 00-1373	5	112.2
CP 00-1751	9	94.0	CP 01-1957	13	91.0	CPCL 99-1401	8	97.3	CPCL 00-4027	10	103.2
CP 00-2164	14	85.6	CP 01-2056	2	100.9	CPCL 99-1777	16	88.7	CPCL 00-4111	9	104.3
CP 00-2180	16	81.3	CP 01-2390	5	99.9	CPCL 99-2103	2	102.3	CPCL 00-4611	8	108.8
CP 00-2188	8	94.5	CP 01-2459	8	98.7	CPCL 99-2206	11	93.6	CPCL 00-6131	4	112.9
-----			-----			CPCL 99-2574	3	101.0	CPCL 00-6756	3	115.2
-----			-----			-----			CPCL 01-0271	15	94.3
-----			-----			-----			CPCL 01-0571	13	98.9
-----			-----			-----			CPCL 01-0877	18	90.0
-----			-----			-----			CPCL 01-1029	2	120.6

† The best cold tolerance is denoted by the lowest rating, and the worst cold tolerance is denoted by the highest rating. Thus, in the CP 00 series, CP 00-1301 had the best cold tolerance and CP 00-2180 had the worst cold tolerance.

Table 19. Dates of stalk counts of 10 plant cane, 10 first-ratoon, and 9 second-ratoon experiments

	Crop		
Location	**Plant cane**	**First ratoon**	**Second ratoon**
Duda	07/10/07	07/19/07	08/13/07
Eastgate	05/24/07	08/02/07	08/10/07
Hilliard	07/25/07	08/03/07	08/27/07
Knight	07/12/07	07/30/07	08/24/07
Lykes	07/20/07	08/06/07	08/28/07
Okeelanta	07/13/07	07/26/07	08/17/07
Okeelanta (successive)	07/17/07	07/31/07	08/23/07
Osceola	07/11/07	07/23/07	08/15/07
SFI	07/16/07	07/27/07	---
Wedgworth	07/09/07	07/24/07	08/14/07

Appendix 1. Sugarcane Field Station Cultivar Development Program

Timeline	Stage	Population	Field layout	Crop age at selection	Yield and quality selection criteria	Disease and other selection criteria	Seedcane increase scheme
Year 1	Crossing	400-600 crosses producing about 500,000 true seeds	—	—	Germination tests of seed (bulk of seed stored in freezers)	Field progeny tests planted by family	—
Year 2	Seedlings (single stool stage) Seedlings start in the greenhouse from true seed of the previous year	80,000-100,000 individual plants	Transplants spaced 12 in. apart in paired rows on 5-ft. centers	8-10 months	Visual selection for plant type, vigor, stalk diameter, height, density, and population; freedom from diseases	Family evaluation for general agronomic type and disease resistance against rust, leaf scald (LS)*, smut, etc.	One stalk cut for seed from each selected seedling
Year 3	Stage I (First clonal trial)	10,000-15,000 clonal plots	Unreplicated plots, 5 ft. long on 5-ft. row spacing	9-10 months	Essentially the same selection criteria as for Seedlings	Permanent CP-series number assignment made	Eight stalks planted for agronomic evaluation. One stalk planted for RSD screening (inoculation)
Year 4	Stage II (Second clonal trial)	1,000-1,500 clones including 5 checks	Unreplicated 2-row plots, 15 ft. long on 5-ft. row spacing	12 months	Yield estimates based on stalk number, average stalk weight, and sucrose analysis; freedom from diseases	Family evaluation for disease resistance against RSD* and eye spot (by inoculation) and LS*, yellow leaf syndrome (YLS), and dry top rot (by natural infection)	Eight 8-stalk bundles cut for seed; two stalks used for RSD screening
Year 5-6	Stage III (Replicated test; first stage planted in commercial fields)	135 clones including 2 checks† per location	Four 2-replicate tests (3 organic and 1 sand site) on growers' farms; Two-row plots, 15 ft. long	10-11 months Evaluated in plant cane and first-ratoon crops	Yield estimates based on stalk number, average stalk weight, and sucrose analysis; clonal performance assessed across locations	Disease screening (inoculation) for LS*, smut, mosaic virus, and RSD; also rated for other diseases (rust, etc.)	Two 8-stalk bundles cut for seed at each location
Year 7-9	Stage IV (Final replicated test; planted in commercial fields)	16 clones including 2 checks† per location	Eleven 6-replicate tests (8 organic and 3 sand sites) on growers' farms; Three-row plots, 35 ft. long on 5-ft. row spacing	10-15 months Tests are analyzed in plant cane, first-, and second-ratoon crops	Cane tonnage, sucrose and fiber analyses; yield estimates based on stalk number and average stalk weight	Disease screening for LS*, smut, mosaic, and RSD; also rated for lodging and suitability for mechanical harvest	Initial seed increase for potential commercial release planted from first-ratoon seed following evaluation in the plant cane
Year 8-11	Seedcane increase and distribution	Usually 6 or fewer clones	Plots range from 0.1 to 2.0 hectares	—	Seedcane purity; freedom from diseases and insects	Plots checked and certified for clonal purity and seedcane quality	Seedcane is increased at 9 Stage IV locations (7 muck and 2 sand)
Soil program	Investigates soil microbial activities and plant nutrient availabilities that influence cane and sugar yields						

* LS: leaf scald; RSD: ratoon stunting disease; YLS: yellow leaf syndrome
† Checks in stages III and IV: CP 72-2086 (all locations), CP 78-1628 (sand soils), and CP 89-2143 (organic soils).